



**SPELLER METCALFE LTD**  
**5 – 11 THEOBALD'S ROAD, LONDON**  
**ACOUSTICS REPORT ON LIMITING SERVICES PLANT NOISE LEVELS**

**B4793/ENV/P1**  
**6<sup>TH</sup> JULY 2007**



Speller Metcalfe Ltd

5 – 11 Theobald's Road, London

Acoustics report on limiting services  
plant noise levels

*Preliminary Issue*

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Document No: B4796/ENV/P1  
Date: 6<sup>th</sup> July 2007

## CONTENTS

|  |           |
|--|-----------|
| <b>1. INTRODUCTION .....</b>                                   | <b>4</b>  |
| <b>2. SITE .....</b>   | <b>5</b>  |
| <b>3. BACKGROUND NOISE LEVELS .....</b>                        | <b>6</b>  |
| 3.1. RESULTS .....   | 6         |
| <b>4. PROPOSED PLANT INSTALLATIONS .....</b>                   | <b>8</b>  |
| <b>5. DISCUSSION / RECOMMENDATIONS .....</b>                   | <b>10</b> |
| <b>6. CONCLUSIONS .....</b>                                    | <b>11</b> |
| <b>APPENDIX 1. FIRST FLOOR PLANT AREA (PLANT AREA 1) .....</b> | <b>12</b> |
| <b>APPENDIX 2. SIXTH FLOOR PLANT AREA (PLANT AREA 2) .....</b> | <b>13</b> |
| <b>APPENDIX 3. SINGLE FIGURE RESULTS .....</b>                 | <b>14</b> |

## **5 – 11 THEOBALD'S ROAD, LONDON**

### **ACOUSTICS REPORT ON LIMITING SERVICES PLANT NOISE LEVELS**

#### **1. INTRODUCTION**

R W Gregory has been commissioned by Speller Metcalfe Ltd to carry out Acoustics Consultancy works for the assessment of the potential noise impact from services plant installations at 5 – 11 Theobald's Road, London.

It is understood that existing services plant has been removed and is to be replaced by new equipment as part of an office fit-out. The Local Authority have requested that a noise assessment be carried out which includes the following information (reproduced from a letter from Jenny Fisher, London Council, dated 20<sup>th</sup> April 2007):

1. Background noise levels before installation of plant
2. Manufacturer's details and noise output from proposed plant
3. Whether proposed plant would comply with London's noise standards in relation to nearest noise sensitive façades (5 – 10 dB below background levels) e.g. residential properties, including a spreadsheet calculation of noise prediction
4. Any means of attenuation or isolation necessary to ensure that the proposed plant complies with noise standards

Since the operational hours of proposed services plant was not known, it was agreed that the limiting noise levels would be based on ambient background noise levels measured at night-time. Limiting plant noise levels are therefore based on a worst case scenario.

For the purposes of this Report, as agreed with Steve Speller of Speller Metcalf Ltd, the nearest noise sensitive receptor (nearest residential dwelling) has been taken as Grey's Inn Hotel, opposite the site over Jockey's Fields road.

## **2. SITE**

The site is located to the north of London on Theobald's Road and adjacent to Jockeys' Fields road, within a predominantly commercial area.

Theobald's Road is a busy road forming part of the A401. Jockeys' Fields road is a one way road to the east of the site and has moderately low volumes of road traffic.

As noted above, it is understood that as part of an office fit out, existing services plant has been removed and is to be replaced by new plant installations. These are to be located at 2 locations, at first floor roof level (to the rear of the development) and at 6<sup>th</sup> floor roof level.

The site comprises a six story building facing Theobald's Road reducing to a four story building at the rear. It was noted that there were other services plant locations in the vicinity of the development.

To the east of the site is Grey's Inn, which is understood to be an operational hotel. The nearest façade, based on site observations is understood to be approximately 30 m from the 6<sup>th</sup> floor roof top plant area.

The buildings to the south and west of the site, forming part of the block between Jockeys' Fields and Bedford Row, are understood to be of mixed commercial and office use.

First floor and rooftop plans are given in Appendix 1 and Appendix 2.

### 3. BACKGROUND NOISE LEVELS

In order to establish the existing ambient background noise levels around the site, an attended noise survey was carried out between midnight and 04:00 hours on 7<sup>th</sup> June 2007. Measurements were taken at various locations on and around the site.

Noise levels were measured using a Class 1 SVAN 945A Precision Sound Level Meter. The meter was calibrated before and after measurements with no significant drift witnessed.

Four noise descriptors were used in measurements, as follows:  $L_{Aeq,T}$ , the average A-weighted noise level over each measurement period;  $L_{A90,T}$ , the A-weighted noise level exceeded for 90% of the measurement period;  $L_{A10,T}$ , the A-weighted noise level exceeded for 10% of the measurement period;  $L_{Amax}$ , the maximum A-weighted noise level in each measurement period. The time period  $T$  for each measurement was set to 5 minutes.

Attended monitoring was carried out at 4 measurement positions as follows:

- Position 1 – located at first floor level in the location of the external plant area to the rear of the site
- Position 2 – located towards the western end of the 6<sup>th</sup> floor plant area
- Position 3 – located towards the south eastern end of the 6<sup>th</sup> floor plant area
- Position 4 – located on ground level on Jockeys' Fields road, approximately 30 m from the junction with Theobald's Road

Measurements were taken with no service plant running associated with the 5 – 11 Theobald's Road site.

#### 3.1. RESULTS

Measured noise levels for each position are shown in the Table below including the arithmetically averaged  $L_{Aeq,5mins}$  and the lowest recorded ambient background level,  $L_{A90,5mins}$ . All measurements are in dB(A).

| Monitoring Position | Arithmetically averaged<br>$L_{Aeq,5mins}$ | Minimum background<br>level $L_{A90,5mins}$ |
|---------------------|--|---|
| 1                   | 48.9                                       | 39.9  |
| 2                   | 55.4                                       | 47.3  |
| 3                   | 56.1                                       | 49.0  |
| 4                   | 55.8                                       | 44.4  |

Single figure results from each monitoring position can be found in Appendix 3.

Measurements taken at Position 4 are considered to be the most representative of the ambient background noise levels at the nearest noise sensitive façade. These were measured at ground level on Jockey's Fields road, approximately 30 m from the junction with Theobald's Road.

It is therefore considered that limiting plant noise levels be designed to 5 – 10 dB below the background noise level of  $L_{A90,5\text{mins}}$  44 dB(A), as outlined in the Local Authority letter (see Section 1 above).

The combined services plant noise should therefore be designed not to exceed  $L_{A90,5\text{mins}}$  34 – 39 dB(A) at the nearest noise sensitive receptor, considered to be Grey's Inn Hotel.



#### 4. PROPOSED PLANT INSTALLATIONS

It is understood that there are two locations for services plant. For the purposes of this report, these have been denoted as 'Area 1' and 'Area 2' as follows:

- Area 1 - 1<sup>st</sup> floor rooftop to the rear of the development site
- Area 2 - 6<sup>th</sup> floor rooftop of development site

Appendix 1 and Appendix 2 show indicative services plant locations in each area, reproduced from received drawings Master 1<sup>st</sup> Floor Bind LT2000 & Master Roof Building Control Bind LT2000.

The following Table shows a schedule of proposed plant for each Plant Area in addition to received noise data. As can be seen, for most items of plant, only Broad Band data available. Noise data has been verified by N G Bailey.

| Octave Band Centre frequency<br>(Hz)                 | 63 | 125 | 250 | 500 | 1K | 2<br>K | 4K | 8K | dB(A)       |
|--|----|-----|-----|-----|----|--------|----|----|-------------|
| <b>Area 1 (1<sup>st</sup> floor level)</b>           |    |     |     |     |    |        |    |    |             |
| 7 large condensers (reference number PURY-P300yGM-A) | -  | -   | -   | -   | -  | -      | -  | -  | 59 @ 1 m    |
| 1 small condenser unit                               | -  | -   | -   | -   | -  | -      | -  | -  | 45.5 @ 1 m  |
| Smoke extract fans for emergency                     | 96 | 94  | 96  | 95  | 94 | 89     | 85 | 74 | 78 @ 3 m    |
| 'AHU Outdoor' Cric 1 MRAC 0091                       | -  | -   | -   | -   | -  | -      | -  | -  | 45.5 @ 10 m |
| 'AHU Outdoor' Cric 2 MRAC 0191                       | -  | -   | -   | -   | -  | -      | -  | -  | 49 @ 10 m   |
| <b>Area 2 (6<sup>th</sup> floor level)</b>           |    |     |     |     |    |        |    |    |             |
| 2/3 AHU condenser - Mitsubishi DN/A 30-5 RC ext      | -  | -   | -   | -   | -  | -      | -  | -  | 59 @ 1 m    |
| 1/3 AHU condenser - Mitsubishi DN/A 60-5 RC ext      | -  | -   | -   | -   | -  | -      | -  | -  | 62 @ 1 m    |
| Indoor condenser reference number PURY-P300yGM-A     | -  | -   | -   | -   | -  | -      | -  | -  | 59 @ 1 m    |
| AHU Supply side of AHU                               | 72 | 67  | 63  | 54  | 47 | 34     | 23 | 14 | 58 @ 1 m    |
| AHU Extract side of AHU                              | 76 | 71  | 67  | 58  | 51 | 38     | 27 | 18 | 62 @ 1 m    |
| WC exhaust fan                                       | -  | -   | -   | -   | -  | -      | -  | -  | 54 @ 1 m    |
| CW booster   | -  | -   | -   | -   | -  | -      | -  | -  | 38 @ 1 m    |



It is noted that Area 1, located at 1<sup>st</sup> floor roof level to the rear of the development has no direct line of sight to the nearest noise sensitive receptor, in addition to which there is a 4-storey building between the plant area and Grey's Inn Hotel. It is considered therefore that noise from Services Plant Area 1 would have negligible noise impact on Grey's Inn Hotel due to the combined barrier attenuation (potentially between 15 and 20 dB) and distance attenuation (in excess of 33 dB).

The combined noise level (excluding the emergency smoke extractor fans) of items of plant proposed at Area 1 is only 67.6 dB(A).

The smoke extractor fan, which would only be used in an emergency, i.e. if the building was on fire, has a noise level of 87 dB(A) at 1 m. It is not known as to the location of this item of plant, although it is considered that since this would only operate during an emergency situation, and not on a daily basis, this should not be included within the calculation process. It is also noted that even should this item of services plant be required to operate, there would potentially only be a 2 dB exceedance of Local Authority criteria, based on the indicative calculations above.

Calculations in the following Section therefore are based on the items of services plant listed for Area 2, the 6<sup>th</sup> floor roof top plant area.

## 5. DISCUSSION / RECOMMENDATIONS

The following Section shows the methodology and calculations to demonstrate that proposed services plant installations would comply with Local Authority criteria.

The following Table shows the calculated noise exposure at the nearest noise sensitive façade, from each item of plant (and the combined level). Calculations have been carried out in Broad Band due to limited data on Octave Band services plant noise levels. All figures quoted are in dB(A).

| Item of plant   | Plant noise data | Distance to nearest noise sensitive façade <sup>‡</sup> | Distance correction | Calculated noise exposure |
|---|------------------|---|---------------------|---------------------------|
| 2/3 AHU condenser - Mitsubishi DN/A 30-5 RC ext                           | 59               | 30  | 29.5                | 29.5                      |
| 1/3 AHU condenser - Mitsubishi DN/A 60-5 RC ext                           | 62               | 38  | 31.6                | 30.4                      |
| Indoor condenser PURY-P300YGM-A   | 59               | 34  | 30.6                | 28.4                      |
| AHU Supply side of AHU  | 58               | 32  | 30.1                | 27.9                      |
| AHU Extract side of AHU   | 62               | 32  | 30.1                | 31.9                      |
| WC exhaust fan  | 54               | 36  | 31.1                | 22.9                      |
| CW booster  | 38               | 39  | 31.8                | 6.2                       |
| <b>Combined noise exposure at 1 m from nearest noise sensitive façade</b> |                  |   |                     | <b>37.0</b>               |

<sup>‡</sup> Note: from site observations, it is understood that the distance from the boundary of Area 2 and the nearest noise sensitive façade is approximately 30 m. Any distances in excess of this are based on known plant locations on the 6<sup>th</sup> floor plant area.

As can be seen, the combined noise level from all services plant running simultaneously is 37 dB(A) at 1 m from the nearest noise sensitive façade, Grey's Inn.

It is considered that in reality, this figure would be considerably lower for the reasons stated below:

- The perimeter of the roof top area has a parapet that would provide an effective barrier attenuation to all items of plant (potentially between 5 – 10 dB)
- The calculations are based on all services plant items operating simultaneously at full load.
- It is not known at the time of writing as to whether all items of plant will operate during the night-time period. However, as previously stated, by designing to the lowest measured night-time background noise level, a worst case scenario has been accounted for



## 6. CONCLUSIONS

As can be seen from the discussion / calculations above, it is considered that noise from services plant proposed for Area 1 (the 1<sup>st</sup> floor roof top plant area located to the rear of the development) is not considered to have any impact on the nearest noise sensitive façade.

Calculations have been shown above to demonstrate that the proposed services plant to be located in Area 2, the 6<sup>th</sup> floor plant area, would meet with Local Authority criteria of 5 – 10 dB below existing ambient noise levels.

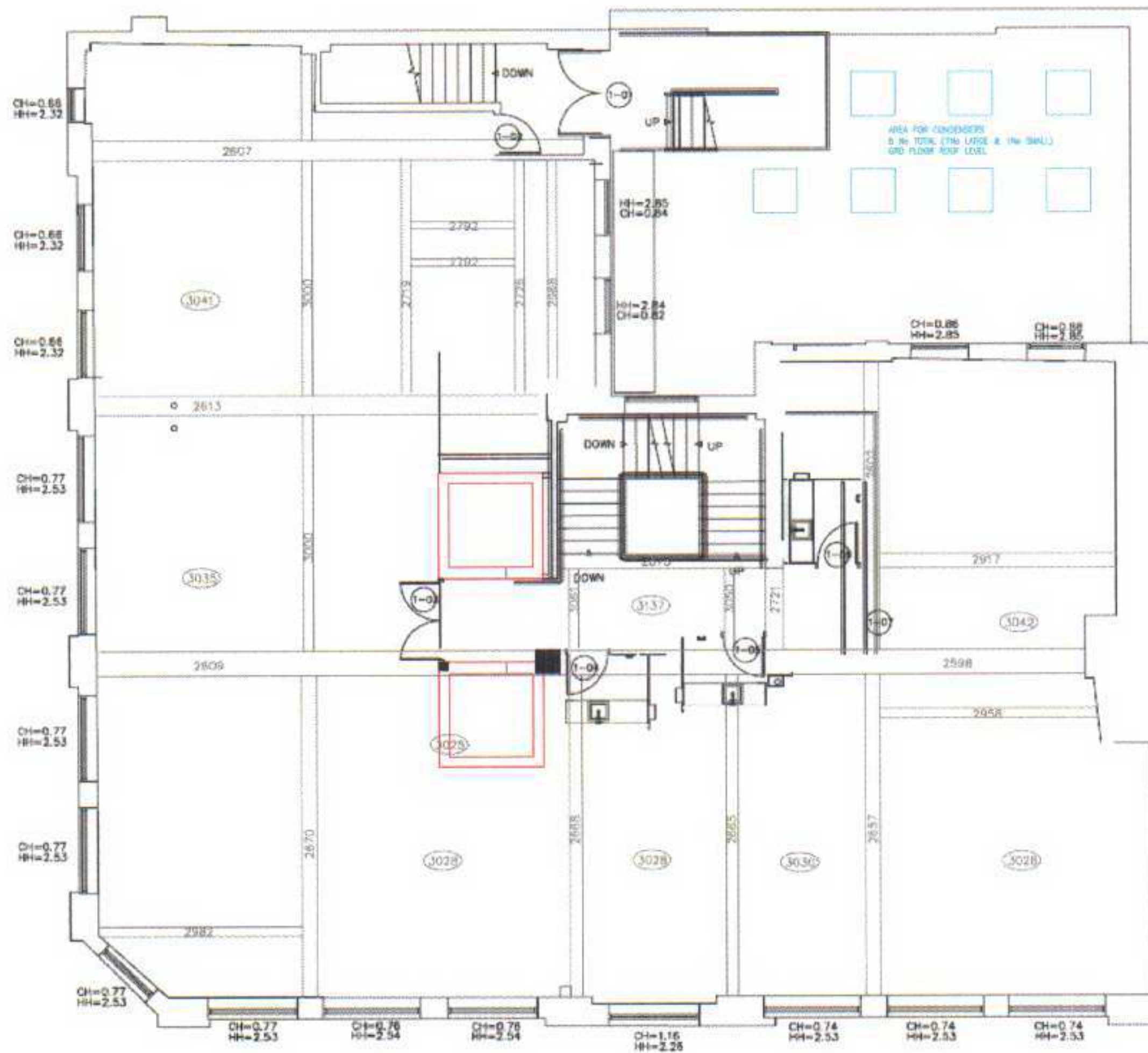
It is therefore considered that, based on services plant noise data as stated within this report, no additional measures are required to attenuate noise from services plant to meet with Local Authority requirements.

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B4793/ENV/P1

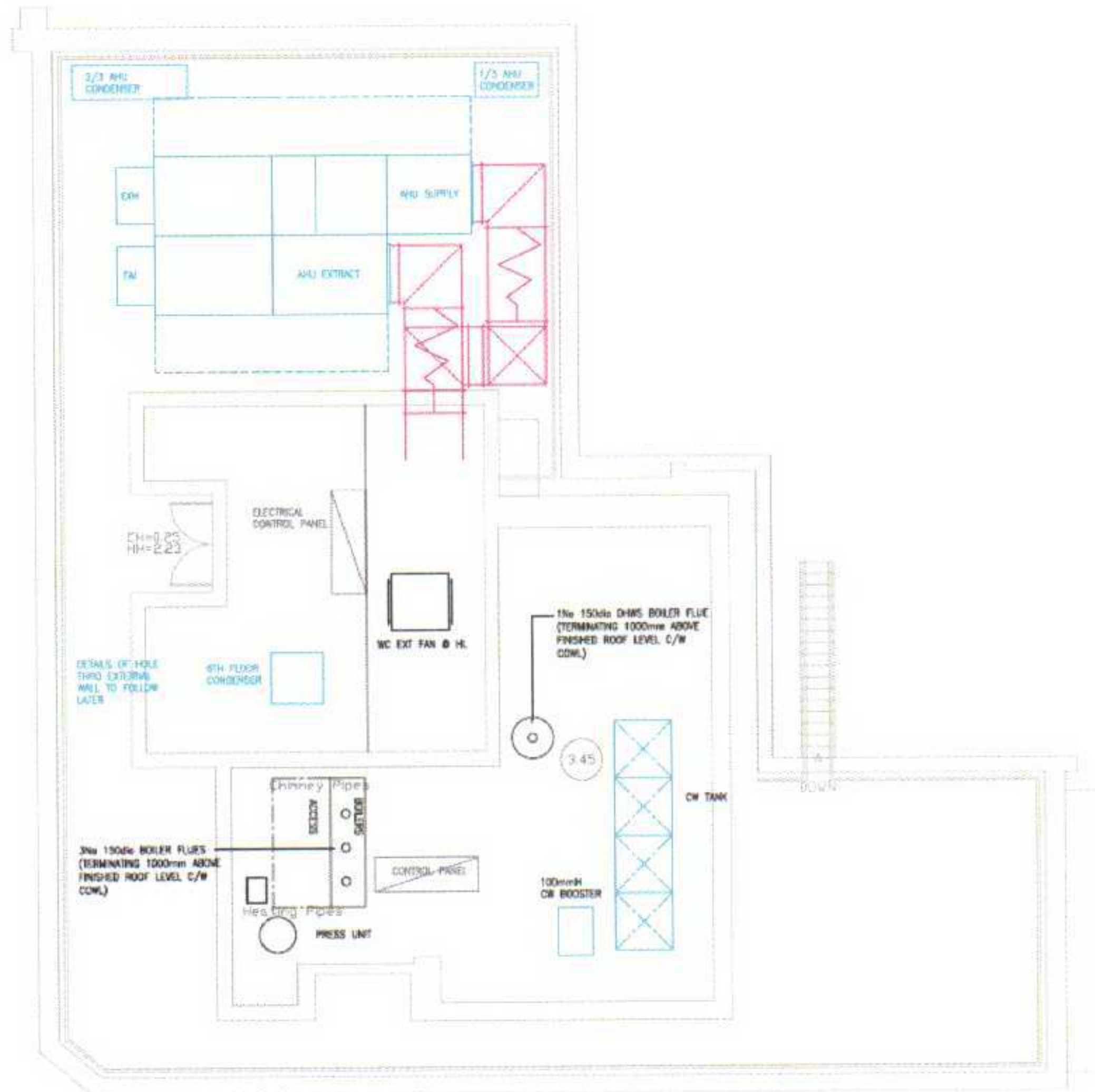
6<sup>th</sup> July 2007

**APPENDIX 1. FIRST FLOOR PLANT AREA (PLANT AREA 1)**





**APPENDIX 2. SIXTH FLOOR PLANT AREA (PLANT AREA 2)**



### APPENDIX 3. SINGLE FIGURE RESULTS

All measurements are in dB(A).

| Measurement Position | Start Time | L <sub>Aeq,5mins</sub> | L <sub>A90,5mins</sub> | L <sub>A10,5mins</sub> | L <sub>Amax</sub> |
|----------------------|------------|------------------------|------------------------|------------------------|-------------------|
| Position 1           | 00:16      | 50.7                   | 44.0                   | 51.2                   | 78.6              |
|                      | 00:21      | 50.0                   | 43.2                   | 53.2                   | 64.4              |
|                      | 00:26      | 49.1                   | 40.9                   | 51.8                   | 60.2              |
|                      | 00:31      | 49.1                   | 43.4                   | 51.8                   | 59.7              |
|                      | 00:36      | 48.5                   | 42.5                   | 51.5                   | 55.4              |
|                      | 00:41      | 49.7                   | 43.0                   | 52.1                   | 61.6              |
|                      | 00:46      | 52.6                   | 40.1                   | 51.9                   | 72.5              |
|                      | 00:51      | 48.5                   | 41.2                   | 51.4                   | 55.3              |
|                      | 00:56      | 48.3                   | 40.0                   | 51.1                   | 59.9              |
|                      | 01:01      | 48.1                   | 41.4                   | 50.7                   | 60.1              |
|                      | 01:06      | 46.4                   | 39.9                   | 50.2                   | 57.4              |
|                      | 01:11      | 47.4                   | 42.2                   | 50.0                   | 54.2              |
|                      | 01:16      | 47.6                   | 42.6                   | 50.3                   | 54.0              |
|                      | 01:21      | 48.8                   | 41.6                   | 51.3                   | 59.2              |
|                      | 01:32      | 54.5                   | 49.0                   | 57.2                   | 63.3              |
| Position 2           | 01:37      | 53.8                   | 47.3                   | 56.9                   | 60.9              |
|                      | 01:42      | 55.5                   | 50.1                   | 58.1                   | 76.5              |
|                      | 01:47      | 56.8                   | 50.8                   | 59.6                   | 64.6              |
|                      | 01:52      | 55.4                   | 49.2                   | 58.3                   | 64.4              |
|                      | 01:57      | 55.6                   | 47.4                   | 59.0                   | 63.0              |
|                      | 02:02      | 55.9                   | 51.0                   | 58.7                   | 62.2              |
|                      | 02:07      | 55.4                   | 50.3                   | 58.3                   | 63.1              |
|                      | 02:12      | 55.9                   | 50.2                   | 57.9                   | 64.7              |
|                      | 02:21      | 55.9                   | 49.4                   | 58.9                   | 69.9              |
| Position 3           | 02:26      | 56.0                   | 50.7                   | 59.0                   | 62.2              |
|                      | 02:31      | 56.0                   | 49.6                   | 59.0                   | 63.8              |
|                      | 02:36      | 54.9                   | 49.0                   | 58.4                   | 61.5              |
|                      | 02:41      | 58.3                   | 50.7                   | 61.4                   | 69.2              |
|                      | 02:46      | 55.6                   | 49.3                   | 59.0                   | 63.2              |
|                      | 02:51      | 56.0                   | 49.0                   | 58.7                   | 66.2              |
|                      | 02:56      | 56.4                   | 50.0                   | 59.8                   | 64.7              |
|                      | 03:01      | 55.7                   | 49.8                   | 59.0                   | 62.0              |
|                      | 03:31      | 55.5                   | 44.5                   | 59.0                   | 67.2              |
| Position 4           | 03:36      | 55.9                   | 46.8                   | 59.1                   | 67.3              |
|                      | 03:41      | 55.6                   | 44.5                   | 59.8                   | 65.9              |
|                      | 03:46      | 56.3                   | 44.4                   | 60.3                   | 66.5              |





|                   |                           |
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